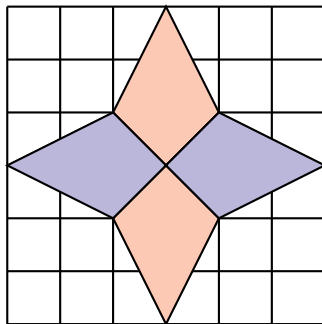


Accuracy Round

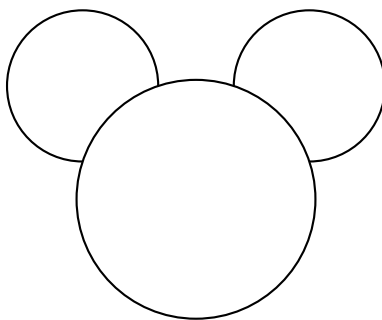
Lexington High School

May 14th, 2022

1. [6] Kevin colors a ninja star on a piece of graph paper where each small square has area 1 square inch. Find the area of the region colored, in square inches.



2. [8] Let $a \spadesuit b = \frac{a^2 - b^2}{2b - 2a}$. Given that $3 \spadesuit x = -10$, compute x .
3. [10] Find the difference between the greatest and least values of $\text{lcm}(a, b, c)$, where a, b , and c are distinct positive integers between 1 and 10, inclusive.
4. [12] Kevin runs uphill at a speed that is 4 meters per second slower than his speed when he runs downhill. Kevin takes a total of 80 seconds to run up and down a hill on one path. Given that the path is 300 meters long (he travels 600 meters total), find how long Kevin takes to run up the hill in seconds.
5. [14] A bag contains 5 identical blue marbles and 5 identical green marbles. In how many ways can 5 marbles from the bag be arranged in a row if each blue marble must be adjacent to at least 1 green marble?
6. [16] Jacob likes to watch Mickey Mouse Clubhouse! One day, he decides to create his own Mickey Mouse head shown below, with two circles ω_1 and ω_2 and a circle ω , and centers O_1, O_2 , and O , respectively. Let ω_1 and ω meet at points P_1 and Q_1 , and let ω_2 and ω meet at points P_2 and Q_2 . Point P_1 is closer to O_2 than Q_1 , and point P_2 is closer to O_1 than Q_2 . Given that P_1 and P_2 lie on O_1O_2 such that $O_1P_1 = P_1P_2 = P_2O_2 = 2$, and $Q_1O_1 \parallel Q_2O_2$, the area of ω can be written as $n\pi$. Find n .



7. [18] A teacher wishes to separate her 12 students into groups. Yesterday, the teacher put the students into 4 groups of 3. Today, the teacher decides to put the students into 4 groups of 3 again. However, she doesn't want any pair of students to be in the same group on both days. Find how many ways she could form the groups today.

8. **[20]** A ray originating at point P intersects a circle with center O at points A and B , with $PB > PA$. Segment \overline{OP} intersects the circle at point C . Given that $PA = 31$, $PC = 17$, and $\angle PBO = 60^\circ$, find the radius of the circle.
9. **[22]** A rook is randomly placed on an otherwise empty 8×8 chessboard. Owen makes moves with the rook by randomly choosing 1 of the 14 possible moves. Find the expected value of the number of moves it takes Owen to move the rook to the top left square. Note that a rook can move any number of squares either in the horizontal or vertical direction each move.
10. **[24]** In a room, there are 100 light switches, labeled with the positive integers $\{1, 2, \dots, 100\}$. They're all initially turned off. On the i th day for $1 \leq i \leq 100$, Bob flips every light switch with label number k divisible by i a total of $\frac{k}{i}$ times. Find the sum of the labels of the light switches that are turned on at the end of the 100th day.
11. **[TIEBREAKER]** Let L be the number of times the letter L appeared on the Speed Round, M be the number of times the letter M appeared on the Speed Round, and T be the number of times the letter T appeared on the Speed Round. Find the value of LMT .